

ABSTRACT

A method and system for use in monitoring/evaluating industrial process such as, for example, plasma processes useful in the fabrication of semiconductor chips, microelectromechanical devices, and the like on semiconductor wafers and the like are provided. In one embodiment, a plasma process fault detection module (100) includes a data selection sub-module (101), a model building/updating sub-module (102), a principal component analysis (PCA) analysis sub-module (103), a model maintenance sub-module (104), a wafer categorization sub-module (105), and a data output sub-module (106). The data selection sub-module (101) obtains selected optical emissions spectra (OES) data for each wafer that is processed. The model building/updating sub-module (102) constructs multiple models from the selected OES data for a number of wafers. The PCA analysis sub-module (103) utilizes PCA techniques to determine whether the selected OES data for a particular wafer differs significantly from that expected for a normal wafer as represented by the models. The model maintenance sub-module (104) saves and retrieves models for different processes, associating the current wafer with the correct process. The wafer categorization sub-module (105) categorizes each wafer based on a scalar metric characterizing the residual spectrum vector. The data output sub-module (106) outputs the results that are obtained to a user.